

We claim:

- 1. An intercalation cathode material having the formula $\text{Li}[\text{Li}_{(1-2x)/3}\text{M}_y\text{Mn}_{(2-x)/3}\text{Ni}_{(x-y)}]\text{O}_2$, where $0 < x < 0.5$, $0 < y \leq 0.25$, $x > y$, and M is one or more divalent cations.**
- 2. A cathode material according to Claim 1, wherein M is one or more of Ca, Cu, Mg, and Zn.**
- 3. A cathode material according to Claim 2, wherein $0.1 \leq x \leq 0.4$ and $0 < y \leq 0.15$.**
- 4. A cathode material according to Claim 3, wherein M is copper, $0.15 \leq x \leq 0.35$, and $0.02 \leq y \leq 0.1$.**
- 5. A cathode material according to Claim 1, which is further characterized by a gravimetric capacity of $>160\text{mAh/g}$ and a capacity fade of $<0.05\%/ \text{cycle}$ over 2.5-4.6V and $\geq 30^\circ\text{C}$ operating ranges.**
- 6. A cathode material according to Claim 1, which is further characterized by a gravimetric capacity of $>250\text{mAh/g}$ and a capacity fade of $<0.10\%/ \text{cycle}$ over 2.5-4.6V and $\geq 35^\circ\text{C}$ operating ranges.**
- 7. A cathode material according to Claim 1, which is further characterized by a gravimetric capacity of $>300\text{mAh/g}$ and a capacity fade of $<0.125\%/ \text{cycle}$ over 2.5-4.6V and $\geq 40^\circ\text{C}$ operating ranges.**
- 8. A battery incorporating a cathode material according to Claim 1.**
- 9. A method for making an improved layered lithium manganese nickel oxide cathode material incorporating one or more of the divalent cations of Ca, Cu, Mg and Zn, comprising forming an intimate mixture of the precursor salts, oxides or both of lithium, manganese, nickel and the incorporated element or**

elements, then subjecting the mixture one or more times to a temperature of about 950⁰C or greater or at least two times to a temperature f less than 950⁰C, whereby a phase-pure layered lithium manganese nickel oxide is formed including the incorporated element or elements.

10. A method according to claim 9, wherein the mixture of precursor salts or oxides is reacted in one heating step at a temperature between 950⁰C and 1050⁰C.